

CONFIDENTIAL



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESI 2012/2013**

COURSE NAME : ADVANCE MACHINING PROCESS
COURSE CODE : BDD 4073
PROGRAMME : SARJANA MUDA
KEJURUTERAAN MEKANIKAL
DENGAN KEPUJIAN
EXAMINATION DATE : JUNE 2013
DURATION : 2 HOURS 30 MINUTES
INSTRUCTION : ANSWER **FIVE** (5) QUESTIONS
FROM SIX (6) GIVEN QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE** (5) PAGES

Q1 (a) Differentiate between transferred plasma arc and non-transferred plasma arc in term of their components and circuit diagram.

(5 marks)

(b) Dual gas plasma torch and water injected plasma are the common plasma arc cutting system available in the market. Compare these systems in term of the working principle, main gases, shielded gases and recommended workpiece.

(15 marks)

Q2 (a) List and explain the **THREE (3)** main parts of laser delivery system.

(6 marks)

(b) Differentiate between Nd:YAG laser and CO₂ laser in terms of their construction.

(6 marks)

(c) Identify and explain the type of laser output available in the market.

(8 marks)

- Q3** (a) **Figure Q3 (a)** shows examples of artificial parts knee component for surgery knee replacement. What modern manufacturing process is capable to produce them? Justify your answer with possible consideration. (5 marks)
- (b) An internally-cooled turbine nozzles has holes at very large angle to a surface as shown in **Figure Q3 (b)**. The material is a super alloy of high hardness. Suggest three non-traditional process learned in this course, according to priorities, that could be considered for making the holes and justify your answer. (5 marks)
- (c) Explain the 2 similarities and differences between Electro Chemical Machine and Electrical Discharge Machine processes. (4 marks)
- (d) In the Electrical Discharge Machine process you are required to
- i) sketch the relaxation generator circuit,
 - ii) sketch graph during charging (ignition) and discharging. (6 marks)
- Q4** (a) State the working principle of Chemical Machining process and draw schematically the sequence of processing steps. (8 marks)
- (b) Illustrate and describe on how to produce a contour using Chemical Machining process. (6 marks)
- (c) Plasma arc cutting is known to have a lower cutting accuracy compared to other thermal based processes. Discuss the reason why plasma arc cutting is still popular used in some industries despite knowing the weakness. (6 marks)

- Q5** (a) A company producing fabric upholstery is planning to apply Water Jet Machining as one of the cutting process. Explain with the help of a sketch, the process of generating the high pressure of water jet. (5 marks)
- (b) Explain the advantages of replacing laser with water jet in machining metallic material. (5 marks)
- (c) Material removal rate used to be one of the important machining characteristic in Abrasive Jet Machining (AJM).
i. Determine TWO more machining characteristic in AJM and
ii. Estimate the material removal rate in AJM of a brittle material with flow strength of 4 GPa. The abrasive flow rate is 2 gm/min, velocity is 200 m/s and density of the abrasive is 3 gm/cc (10 marks)
- (d) What would happen if the water used for Abrasive Water Jet Machining was replaced with kerosene? Justify your answer in terms of machining performance. (4 marks)
- Q6** (a) List **FOUR** factors that affects the material removal rate (MRR) during ultrasonic machining (USM). (4 marks)
- (b) Conicity is one of the factors that affect the dimensional accuracy during ultrasonic machining (USM). Explain how conicity can be improved. (6 marks)
- (c) You are required to fabricate a component as shown in **Figure Q6** by using ultrasonic machining (USM) process. Draw an ultrasonic machine construction that can be used to produce the component. Your answer should consist a schematic diagram of the machine construction and the function of each major machine's elements/components. (10 marks)

FINAL EXAMINATION

SEMESTER / SESSION : SEM I / 2012-2013
COURSE : ADVANCE MACHINING
PROCESS

PROGRAMME : 4 BDD
COURSE CODE : BDD4073

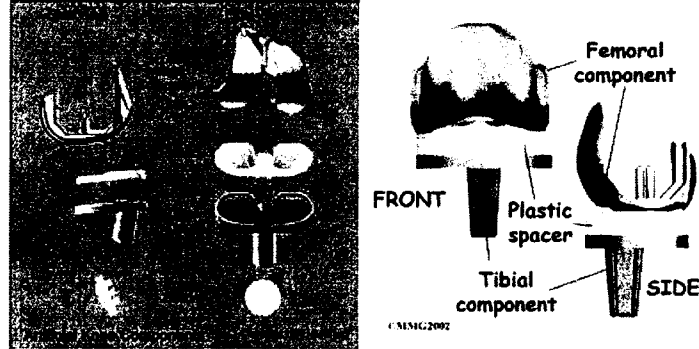


FIGURE Q(A)

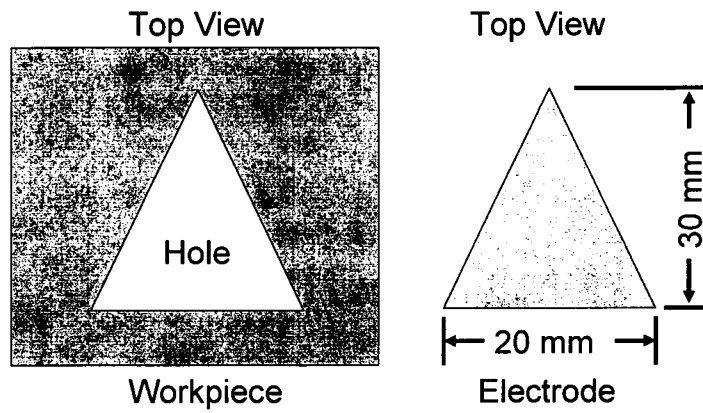


FIGURE Q3 (B)

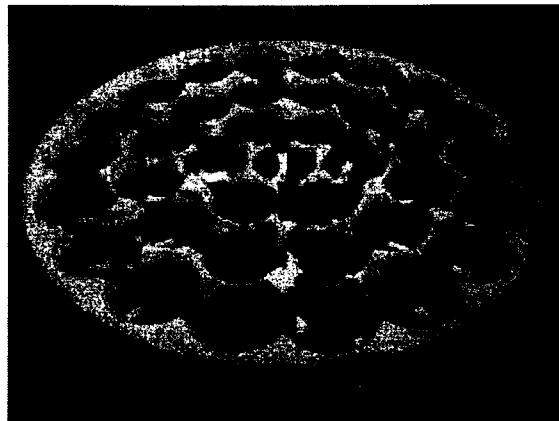


FIGURE Q6